

Program Review – Annual Program/Discipline Update  
**Administrative Response and Follow Up**  
2020-2021

**Program/Discipline: Chemistry**

SAC Chair(s): [Kenneth Friedrich & Patty Maazouz](#)

SAC Administrative Liaison: [Dieterich Steinmetz](#)

Other Division Dean(s): [Laura Horani](#), [Alyson Lighthart](#), [Mathew Altman](#)

Department Chair(s): [Rod Lee \(2020 SY\)](#), [Jim Schneider \(2021 SY\)](#), [Danijela Vukic \(RC\)](#), [Mike Mackel \(SE\)](#), [Kenneth Friedrich \(CA\)](#)

Date: [April 18, 2021](#)

This section is for Administration to provide feedback.

To be prepared by Division Dean(s) and reviewed by DOI(s).

**1. Strengths and successes of the program as evidenced by the data, analysis and reflection:**

**Introduction**

The Chemistry SAC is commended for demonstrating curiosity and a proactive and flexible approach to program assessment and improvement. The SAC has done so for many years. For this most recent year, the considerable work invested in the pilot of the *Annual Discipline Update* is very much appreciated and the SAC's work will help to improve the ADU and will advance the shared objectives of the SAC in the months ahead.

**Strength in Curricular Flexibility, Collaboration, Updates, and Retention**

In its pursuit of curriculum improvements that immediately benefit PCC students, the Chemistry SAC is exceptionally active. This work relates directly to our shared YESS objectives at PCC. Highlights of this work include: 1) the successful and very rapid adaptation of laboratory courses for "temporary" remote instruction in spring 2020; 2) collaborative curricular revision (CH 100 customization for the CMET cohort); 3) substantive updates to numerous course-specific objectives and benchmarks (CH 100, CH 151, CH 221-222-223, and CH 241-242-243); 4) projects with a *specific focus on improving retention and completion rates* (CH 104 module introduction videos, CH 151 web-accessed placement testing, CH 151 Mastery-based learning project).

## **Strength in Commitment to YESS**

Members of the chemistry SAC bring a variety of life experiences and specific interests. SAC members have completed a range of projects and professional development in support of PCC's YESS commitments. Highlights of recent such work include: 1) completion of PCC JEDI training and planning for additional JEDI training to including many part-time and full-time faculty; 2) *change-driven sabbatical projects* that elevated "Diversity, Equity and Inclusion in STEM" and prioritized increased student completion rates in CH 151, a "gateway course" to the General Chemistry sequence; 3) support via publicity and direct encouragement of individual students to access early undergraduate research opportunities (EXITO, LSAMP, various REUs, S-STEM at PSU). This work supports long-term transformation of culture at PCC and it has *direct and immediate positive impact on student success*.

## **2. Areas of challenge or concern, if any:**

### **Challenges of supporting a large chemistry faculty team:**

The Chemistry SAC is commended for identifying and reflecting upon five specific challenges in this cluster of concerns: 1) managing high employee turnover among part-time chemistry faculty who may be drawn to opportunities outside of PCC; 2) scalability of mentoring and training opportunities (i.e., routine inclusion of most faculty rather than intermittent inclusion of some faculty based on a course, a campus, a time of year, or availability of a campus-centered faculty mentor, or campus-specific TLC opportunities, etc.); 3) identifying best practices in STEM instruction, ideally ones that "don't require hours of training time," 4) the burden of course preps across the college for part-time faculty, since a course at one campus regularly uses different texts, different equipment, different supplies, even different weekly lab objectives, than a course at another PCC campus, or at PSU, or at another college at which they teach.

*These four challenges emerge at and are amplified by the intersection of PCC's reliance on a large part-time faculty group, a high level of section-specific instruction in chemistry (even within PCC's one-college model) and the practice of last-minute staffing or re-staffing of chemistry sections, albeit done in the interest of increasing student access. An individual part-time instructor, for example, may teach 4 sections of a course over the year, suggesting that there would be a single course prep that could be utilized four times and refined through practice. The reality on the ground, however, is different and this part-time instructor may see four very different course preps - different (campus-specific) textbooks, different (campus-specific) equipment and laboratory protocols, different digital courseware (online resources for students that an instructor would need to master), different syllabi and grading point systems, and different procedures for communicating lecture-lab scoring with campus colleagues. In some cases, the instructor may experience substantial meaningful mentoring, and in some cases may receive explicit direction that some have experienced as time-saving and others have experienced as challenging to academic freedom, and in other cases the instructor may operate largely without such support and may be left to discover week-by-week many details of*

their teaching assignments when teaching at a new location. The deans acknowledge that these challenges often emerge *despite considerable effort undertaken by chemistry faculty to mitigate them*, and despite a shared interest in making PCC a supportive place for faculty and students. In this spirit, the deans with chemistry are eager to explore specific actions that the SAC and the one-college operational model can prioritize and implement in the upcoming year. Together we aspire to make improvements that have near-term benefits for students and benefits for full-time and part-time faculty. Near term benefits may include, for students, increased mobility across campuses in the middle of a course sequence when course materials and lab equipment become more aligned to a one-college model. For faculty, benefits may include a shared process for new-instructor onboarding, simplified priority lists for equipment, supplies and teaching materials, and increased clarity of “rules” for part-time faculty who are seeking to fall in line with the practices of full-time faculty at multiple campuses. There is much to explore and prioritize. One way that some SACs elevate student voices in decisions about college-wide adoption, for example, is to simply include student input when adoption decisions are made.

### **Challenges in student access and technology**

The Chemistry SAC is commended for taking steps to increase student access (eg., online version of the CH 151 placement exam), to accelerate student completion (increase completion rates in Ch 221), and to improve quality of instruction (eg., creation of videos that allow students to observe and record “real data” during remote operations). These steps demonstrate thoughtful and selective utilization of technology inside and outside of the classroom.

Remote operations has presented several specific challenges that deserve attention and collaboration across the college:

- 1) Assessment integrity: Web-based instruction and the same cohort models that support student success makes likely an increase in sharing of homework and test question solutions that are the basis for assessment of student learning. This yields many of our existing assessment tools *unreliable* among students who are sharing questions and solutions via online platforms such as Chegg, via class group email lists, and via other mechanisms. These mechanisms are not likely to go away or to decrease in complexity in the coming decade, and while the college is already taking steps to coordinate communications with Chegg and others (eg., to have exam answers removed), additional solutions will undoubtedly be required in the classroom. With the realization that there will be no single solution, the Chemistry SAC is encouraged to engage with faculty peers, with the TLC, and with our OL office to continue exploring assessment options that may look very different from those historically used to assess student learning. Assessments that are contextualized, especially if local and current, are less susceptible to Chegg and, in addition, these can engage students who may not easily identify as “STEM students.”
- 2) Information security: The increased use of online materials challenges 1) the security and long-term viability of the CH 151 exam, 2) protection of students’ personal

information when students are directed by faculty to work outside of PCC's D2L system (eg., "big data" actors that may cross-reference student user data from legitimate out-of-D2L homework websites, from student browser histories, from instructor review websites, and from solution sharing website (eg., Chegg), and 3) the workload of our PCC DS Office and PCC Information Security teams in supporting students and employees with reasonable timelines (i.e., short timelines) for implementation of course materials that are discovered by faculty on even shorter timelines. The Chemistry SAC is encouraged to engage in the upcoming year with the recommendations of the PCC Digital Courseware Task Force and to consider creative ways to make all-SAC (i.e., "one college") decisions about course materials adoptions, and to do so with an emphasis on universal course design.

- 3) Supply availability: Lab kits, utilized to allow access to lab activities outside of PCC's on-campus laboratories, are often available in the early months of course scheduling, but not actually available, reliably, to students at the time of registration or at the start of term due to rapid shifts in supply availability (eg., COVID-19) and rapid changes in enrollment demand nation-wide. The Chemistry SAC is commended for the considerable work done in the face of remote instruction, for holding focus on cost-to-student pricing, and for exploring alternatives in a rapidly changing landscape of supply availability. The Chemistry SAC is encouraged to continue this work and to explore with the deans the possibility of having additional assistance from our science laboratory technicians if this would be meaningful support.
- 4) New technology-heavy skill sets that align with DEI values: The increase in online and remote instruction has pushed many employees to new technology spaces. Many individual SAC faculty have engaged in multiple training sessions focussed on course accessibility and student engagement during remote instruction. In addition, the SAC as a whole is supporting PCC's STORI project to improve online and remote courses systematically (CH 100 and CH 151). Perhaps most significant, however, is that many faculty worked independently and with peers to share class resources, share tips, and avoid common pitfalls. PCC continues to offer many new OL and remote training opportunities, including stipends for part-time faculty in many cases. On a more chemistry-focussed basis, the Chemistry SAC is encouraged to engage with the TLCs in the TLC's new one-college structure, and to consider grant opportunities that are available now (including a draft proposal already underway) and that support increased professional development with a focus on STEM - with stipends for part-time faculty.

### **3. Reflection on goals and resources:**

#### **Faculty and Faculty Support**

1. Increase full-time faculty:

The division deans with chemistry support hiring a full-time faculty member at SE Campus as well as filling the chemistry faculty positions that are currently vacant (3

positions total). We recognize that filling vacant positions will not bring PCC near the 75% FT/PT ratio that the national guidelines recommend. Potential new and vacant positions are being gathered on a college-wide list that will be examined in spring 2021. The division deans with chemistry support filling these vacant positions with 1-year or 2-year temporary positions in the event that the College chooses to spend the 2021-2022 year determining college-wide benchmarks and priorities for filling future full-time faculty positions.

In addition, the division deans with chemistry support a faculty member with dedicated time, perhaps 50%, to support the growing interest (legislators, parents, students) in dual-credit. Specifically, dual credit development will benefit from administrative, faculty, and IT support equivalent to the support afforded PCC's on-campus, remote, and online courses. A new model, recently revised and used with the math dual-credit courses could serve as an example on which to build chemistry courses that include laboratories and college credits with standards to those found across PCC's on-campus, remote, and online chemistry courses.

2. Increase flexibility in payment of the part-time faculty stipends for SAC meeting:

The division deans with chemistry support making improvements to the infrastructure of SAC support that will allow all SACs to have the option to split one-day stipends into two half-day stipends for SAC meetings. We acknowledge that this requires increased clarity on the limits of stipends and increased clarity on the requirements of planning (i.e., Is the full-day limit a limit for the SAC, or a limit for an individual part-time faculty member, what are the budgetary implications of improving and supporting college-wide flexibility; and what are the employment regulations that would guide essential documentation of this work and its pay?)

3. Training for faculty with a focus on best practices in STEM instruction:

“Does PCC have a list of best practices to enable various student populations to be more successful? This information needs to be disseminated to full-time and part-time faculty in a manner that can easily be implemented without hours of training.”

The division deans with chemistry support identification and implementation of practices that increase equitable student success. Lists of such practices exist in many spheres; rarely are such practices simple and achievable at scale without significant investment of time and additional resources. As an immediate step to take in the upcoming year, the division deans with chemistry support engaging with the district TLC Coordinator and with the PCC Grants Office to prioritize opportunities that align with YESS and the shared interests of the Chemistry SAC faculty. Such best practices, in sciences and in engineering, have been included in a number of the grants that PCC, PSU, UP, and OSU have obtained (including grants that many chemistry faculty have supported) and the deans realize that scaling up such YESS-supporting practices is likely to require a *long-term commitment* both of PCC resources and of PCC chemistry faculty.

## **Equipment, Safety, and Course Materials**

1. Resolve equipment and safety concerns:

The division deans support a near-term (spring-summer 2021 if achievable) college-wide inventory of essential instructional equipment that isn't functional and that may need replacement, upgrade, or discontinuation. In addition, it will be useful to create a college-wide set of equipment and infrastructure priorities that - while not likely to be

addressed this academic year - should be elevated in priority and must be considered in the upcoming year as PCC's budgetary model is restructured to align with PCC's new one-college organizational structure. Of particular interest and concern are items that have historically existed on the boundary of "instruction," "student services," and "facilities." The Rock Creek fume hoods are a good example of an essential component of chemistry instruction that has existed in the facilities budget but that is nevertheless critical for student activities and core chemistry curriculum in many courses.

Regarding safety concerns, the division deans, lab techs, department chairs and PCC EHS team work regularly to address safety concerns. Chemistry faculty are urged to reach out immediately regarding immediate safety concerns, and to work during spring 2021 to create an inventory of non-immediate but nevertheless important opportunities to boost safety for students and employees. Please share those concerns in writing with the campus division dean with chemistry (or with the future "Program Dean" with chemistry in PCC's new organizational structure.)

## 2. Inventory of course materials and status of these materials:

The division deans support a near-term (spring-fall 2021) college-wide update of instructional course materials that the Chemistry SAC recommends for students to purchase. The Chemistry SAC has done a great job keeping an inventory of textbooks. In 2021, in light of how many "required" materials are digital purchases, "required course materials" regularly include items that are not textbooks. SAC recommendations need a refresh and this refresh will help set priorities for purchases that, for example, could be supported college-wide (i.e., site license and D2L integration), could be proactively examined by our PCC Disabilities Services team, and could be proactively supported by our Veterans Resources Centers (i.e., items that may not otherwise be fundable using Veterans' benefits opportunities.)

## Data-driven Change in Instruction

### 1. Student exit survey:

"PCC needs to implement a quick survey when a student drops a class to determine why the student dropped. This should include inadequate course preparation, personal reason, work or family conflict, etc."

The division deans with chemistry support exploration of an exit survey for chemistry students who drop or withdraw from a course. Such "lost customer" surveys are part of modern marketing practices. And such self-report data could impact, for example, how faculty structure courses, what course materials are required for purchase, and what technology is expected of students. *The SAC is cautioned, however, that such self-report data is fraught with selection bias* (i.e., bias toward respondents that have time and resources to respond) and reporting bias (i.e., bias toward "safe" responses that do not shift blame onto the instructor or the respondent). An exploration of the SAC's ideas regarding how survey results would be used may yield additional ways (ways in addition to a survey) to uncover the reasons that DWF rates in chemistry are not evenly distributed. Alternatively, if the SAC already has reason to believe that students who take a DWF in chemistry have higher than average rates of "inadequate course preparation, personal reason, work or family conflict, etc." then it may be worthwhile - with or without a survey - to *consider the ways that PCC generally and the Chemistry SAC specifically could support students with the same "inadequate course preparation, personal reason, work or family conflict," etc.* It is unlikely that such issues will become

less common in the years ahead. Strategies may include embedded tutoring, flexible early assignment deadlines, and other tested strategies that may level the playing field.

2. College-wide redesign in CH 100:

The division deans support a major curricular update to CH 100. This is an important non-majors class that is on the General Education course list. It is recommended that this redesign not be rushed or incremental.

The estimate of \$8,000 seems low to take on a major redesign of such a complex laboratory course. Consider engaging with the PCC TLC and working through a deliberate instructional design process that supports the course being adopted uniformly college-wide. A more realistic estimate of cost and time commitments can be developed with the support of the division deans (or “Pathway Dean” in PCC’s new organizational structure) and the PCC TLC. Rather than taking an incremental approach to this redesign, it is recommended that the course be looked at holistically and with input from partners such as the PCC IT team, PCC DS, and PCC identity centers (VRC, QRC, WRC) to make equitable student success a top priority in each step of the redesign of this course.

3. Multiple modalities of instruction:

“Several modalities offered for most chemistry courses after the pandemic” in 2021-2022.

The division deans support this work. Although much work is already underway under the STORI project, it is likely that additional work will be helpful after this project closes. The Chemistry SAC is encouraged to reach out to the division deans (or the “Pathway Dean” in PCC’s new organizational structure) to attend to needs that are uncovered in 2021-2022.

4. CH 151 Mastery-based instruction:

“Implement Mastery-Based learning in CH151 face-to-face courses to improve student success.”

The division deans support this work and future support for faculty to implement this broadly. Although much work is already complete (i.e., prior sabbatical success), it is likely that additional needs will become evident in the year ahead. The Chemistry SAC is encouraged to reach out to the division deans (or to the “Pathway Dean” in PCC’s new organizational structure) to attend to needs that are uncovered in 2021-2022, especially those that involve training opportunities for chemistry faculty who are new or who are simply unfamiliar with this project.

**4. Recommended next steps:**

Proceed as planned on program review schedule

Follow up conversation needed with SAC, Dept Chair(s) and Dean  
Please see the list of suggested follow-up conversations, below.

## 5. Additional comments/questions:

### Conclusion / Topics for follow-up conversations include:

The table below is intended to be a project start list. Timelines and initial consideration for participants and outcomes are suggested.

<u>Project</u>	<u>Initial Action and Participants</u>	<u>Timeline and next step</u>
FT faculty hiring	Deans to add a SE faculty position and vacant positions to the district list for consideration.	April 2021, for subsequent all-college consideration in spring-summer 2021
Flexibility with SAC day stipends	SAC representative, dean, Academic Affairs, HR Rep to meet and define needs including splitting one full day into two half-days.	Spring/summer so changes can be considered for fall in-service.
STEM best practices resources for retention and completion	SAC representative, dean, TLC Coordinator, representative from OL, representative from Grants Office, to meet and define interests, existing resources, and priority new resources.	Initial Spring meeting, with follow-up in fall 2021. If possible collaborate with similar interests of Physics SAC.
Student exit survey	SAC to draft a list of questions, and a short list of specific examples of how resulting data is likely to be used by SAC faculty to alter instruction.	SAC to determine next steps. Reach out to division dean and TLC as needed.
Multiple modalities of instruction for most chemistry courses	STORI project is underway February - August 2021. Dean to share information about new AdAstra software opportunities with Chemistry SAC	SAC to reach out to division dean and TLC as needed. Information about AdAstra should be available in fall 2021.
CH 151 Mastery implementation	Faculty to pilot based on already completed sabbatical work.	After returning to campus. SAC faculty to reach out to division dean and TLC as needed.
Ch 100 Redesign	SAC Representative, dean, instructional designer to meet to explore scope of project, estimate cost, estimate timeline	SAC to identify representatives and schedule meeting.

<p>Course materials inventory and descriptions</p>	<p>SAC Representative, dean, academic affairs to meet to determine mechanism for tracking a “course materials” inventory, scope of items to be included, and descriptors (eg., adoption status, cost to students, instructor- vs campus- vs college-wide adoption, and/or other details that impact accessibility and ability to adopt college-wide.)</p>	<p>June - September to generate an initial list that can be shared broadly at the fall SAC meeting for feedback.</p>
<p>District chemistry equipment priority list</p>	<p>SAC Representative from each campus, lab tech representative from each campus, and dean meet to define scope of inventory.</p>	<p>June - September to generate an initial list that can be shared broadly at the fall SAC meeting for feedback. Infrastructure items to be shared with FMS and PCC Capital &amp; Construction.</p>